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International Network Generations Roadmap (INGR) 2021 Edition Published

The 2021 Edition Chapters of the INGR are now published and available for download exclusively by Future Networks community members. Updated versions of all the original INGR chapters are joined by new content on Energy Efficiency, Systems Optimization, Deployment, Artificial Intelligence/Machine Learning, and Connecting the Unconnected.

The purpose of the International Network Generations Roadmap (INGR) is to stimulate an industry-wide dialogue to address the many facets and challenges of the development and deployment of 5G in a well-coordinated and comprehensive manner, while also looking beyond 5G by laying out a technology roadmap with 3-year, 5-year, and 10-year horizon. Future network technologies (5G, 6G, etc.) are expected to enable fundamentally new applications that will transform the way humanity lives, works, and engages with its environment. INGR, created by experts across industry, government and academia, is designed to help guide operators, regulators, manufacturers, researchers, and other interested parties involved in developing these new communication technology ecosystems.

Development of the INGR has produced a technical community that fosters the exchange of ideas, sharing of research, setting of standards, and identification, development, and maturation of system drivers, system specifications, use cases, and supported applications. As work continues, new experts are encouraged to participate, to evolve and strengthen this crucial document. Join us!

Technology Policy and Ethics

[IEEE Future Directions Technology, Policy and Ethics](#) publishes articles addressing issues in current and future technologies, including the social and ethical considerations. We are currently seeking submissions of original content, articles of 800-1200 words on the implications of technology, including but not limited to policy and ethics topics. If interested, please email FDPolicyEthics@ieee.org. Learn more about submitting an article through the [author guidelines](#).

Emergent Role of Artificial Intelligence in Higher Education

Christopher Nouhan, Noah Scott, James Womack, *Ball State University, Muncie, Indiana*

Artificial Intelligence (AI) has been seamlessly integrated into our lives. In 2016, Barack Obama reported, "the walls between humans and AI systems are slowly beginning to erode, with AI systems augmenting and enhancing human capabilities. Fundamental research is needed to develop effective methods for human-AI interaction and collaboration." As institutions of higher education continue to grapple with the impacts of COVID-19, some are turning to existing technologies to make educational experiences safer, more efficient, and more adaptable to changing environments. AI in higher education (AIEd) enables institutions to have meaningful impacts on teaching and learning environments.

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Psybersecurity: A New Emerging Topic and Research Area Within Human Security - Part 2

Carlee Franklin and Ankur Chattopadhyay, *Northern Kentucky University*

During these current COVID-19 times of tension, stress, lockdown-driven isolation, social distancing, and economic recession, opportunities to exploit others has risen dramatically for hackers. Cybersecurity attacks are being orchestrated around individual weaknesses related to face masks, preventative care, stimulus checks, and unemployment issues. Hackers' awareness of human vulnerabilities has become more apparent over the COVID outbreak through the latest cybersecurity attacks, including social engineering cases such as phishing, vishing, internet fraud, and online scams.

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Read Part 1

Current Activities in our Technical Communities

The IEEE Healthcare: Blockchain & AI Virtual Series is a fully virtual event series designed to convene a robust and vibrant community around the topic of blockchain and AI enabled healthcare. Sessions are held on the first Wednesday of each month. Our next virtual session on Wednesday, 2 June, will focus on decentralized clinical trials. Register now on the [IEEE Healthcare: Blockchain & AI website](#).

Visit Web Portal

Looking for inspiring interviews with experts and innovators in the neurotechnology field? The IEEE Brain Community recently published a library of video interviews. The selected subject matter experts share their business insights and experiences, from research to start-ups and more. Visit the IEEE Brain Neurotech Entrepreneurs Corner to view the videos.

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IEEE Cloud Computing is now the IEEE Technical Committee on Cloud Computing. The community provides a forum for members to broaden professional contacts, facilitates information exchange, and stimulates the growth of research, education and industry in cloud computing. Visit the IEEE TCCLD web portal to learn more.

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The IEEE Security Development Conference (SecDev2021), a venue for presenting ideas, research, and experience about how to develop secure systems, is scheduled for 18-20 October. This virtual event is currently accepting submissions for papers, tutorials, practitioner submissions and posters. Visit the SecDev2021 site for more details and deadlines.

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The IEEE Digital Reality webinar series has quite a number of productions on-demand and planned for the future. Join David Carmona, the General Manager for AI and Innovation at Microsoft, during the next webinar on 18 June 2021. David will discuss the key technological trends that will fuel that revolution, including massive AI models trained on supercomputers, autonomous systems that learn with humans, augmented intelligence, and responsible AI. Shortly after, on 8 July, Patrick Henz will discuss AI and responsibility. Visit the Digital Reality Education page to discover upcoming webinars, access on-demand recordings, and register for the chance to participate in a live Q&A session.

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and available for download exclusively by Future Networks community members. Updated versions of all the original INGR chapters are joined by new content on Energy Efficiency, Systems Optimization, Deployment, Artificial Intelligence/Machine Learning, and Connecting the Unconnected. Join IEEE Educational Activities and the Future Networks Initiative for the second part of the series on Bridging the 4G/5G Gap: Telecommunications Roadmap for Implementation by David Witkowski. The April 2021 *Tech Focus* issue is now available and includes articles on Fronthaul/Backhaul Networks, Optical Transport Network Design, Open-Source Cellular Radio Network, and Connectivity for Air Mobility Transportation.

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Reserve your spot for the 2021 World Forum on Internet of Things (WF-IoT) to hear from innovative international technologists and industry leaders in critical subject areas of IoT as they explore the future and promise of IoT and the impact artificial intelligence has on its progression, innovation, and deployment for the benefit of society and humanity. The forum's comprehensive, 6-week program includes an impressive array of keynote speeches delivered by distinguished speakers from industry, academia and the public sector; panels and forums; technical sessions featuring peer-reviewed technical papers; workshops focusing on the latest trends in various technologies; tutorials delivered by experts in respective disciplines; programs in Entrepreneurship, Women in Engineering, and Young Professionals; sessions for practitioners, policy makers, and executives.

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The Life Sciences Community fosters collaboration and communication among life sciences and technology practitioners to advance the application of life sciences among technology companies, hospitals, government organizations, pharmaceutical company researchers, and university researchers. For more information, visit the IEEE Life Sciences portal, and join their Technical Community to get involved.

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The 2nd IEEE International Conference on Quantum Computing and Engineering (QCE21), IEEE Quantum Week 2021, will be held on 18-22 October. IEEE Quantum Week invites contributions and participation from the international quantum community to form an exceptional program with

world-class keynote speakers, technical paper presentations, innovative posters, exciting exhibits, technical briefings, workforce-building tutorials, community-building workshops, stimulating panels, and Birds-of-Feather sessions. Learn more at the IEEE Quantum Week 2021 website, and access the call for contributions and submission deadlines.

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The IEEE Computer Society Task Force on Rebooting Computing (TFRC) offers an interdisciplinary information exchange that explores the growth of novel approaches to future computing. Upcoming events include: International Symposium on Roadmapping Devices and Systems (ISRDS), a virtual symposium on 26-27 May featuring read-outs that preview the 2021 International Roadmap for Devices and Systems (IRDS™) and highlights from the 2020 IEEE International Conference on Rebooting Computing (ICRC 2020), and Efficient Deep Learning for Computer Vision (ECV 2021), a virtual workshop at CVPR 2021. Visit TFRC to learn about activities and upcoming events, access featured articles, and get involved.

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The 2021 IEEE Smart Grid for Smart Cities International Forum (SG4SC) was held on 17-23 March. Content from SG4SC is now available online at the IEEE Smart Grid Resource Center.

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Save the Date for the 2021 IEEE International Smart Cities Conference virtual conference, 7-10 Sept, 2021. If you are interested in presenting a tutorial, click here.

If you missed the IEEE Smart Cities Live Webinar, "Everything You Wanted to Know about Smart Healthcare" on 25 May, you can still watch the recording.

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The 7th IEEE International Conference on Network Softwarization (IEEE NetSoft 2021) will be held virtually on 28 June - 2 July with the theme Accelerating Network Softwarization in the Cognitive Age. IEEE NetSoft 2021 will showcase the latest research and development results

including artificial intelligence / machine learning, self-driving and autonomic networking, policy-based network management, dynamic network slice provisioning, among other promising research areas for the sake of robust, reliable, and cognitive softwarized networks. Learn more and register at the IEEE NetSoft 2021 website.

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IEEE is pleased to announce the second of a series of webinars that will focus on Sustainability within the Information and Communications Technology (ICT) industry. On 1 June, Louise Krug, the technical lead for BT's Applied Research Sustainability work, will talk about "SubClimate Change and Telecommunications". Technology improves lives, saves lives, and enables sustainable living, but does it cost the planet? Louise will highlight some of the actions that are being taken to ensure this is not the case, and identify the open problems that we face. Register today.

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The IEEE Transportation Electrification Community (TEC) seeks to accelerate the development and implementation of new technologies for the electrification of transportation which is manifested in the electric vehicles (EV) of today and the future. Visit the TEC website to see the latest events, publications, and news on EVs.

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IEEE Future Directions Events

- 2021 IEEE 7th World Forum on Internet of Things (WF-IoT)
  14 June - 31 July 2021, New Orleans, Louisiana, USA / Online
- 2021 IEEE 7th International Conference on Network Softwarization (NetSoft)
  28 June - 2 July 2021, Online
- 2021 IEEE International Smart Cities Conference (ISC2)
  7-10 September 2021, Online
- IEEE Digital Privacy Workshop
  7-8 October 2021, Online
- 2021 IEEE 5G World Forum (5GWF'21)
  13-15 October 2021, Montreal, Canada / Online
- 2021 IEEE International Conference on Quantum Computing and Engineering (QCE)
  18-22 October 2021, Online

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